SIERRA LEONE CIVIL AVIATION AUTHORITY

ADVISORY CIRCULAR

SLCAA-AC-ANS009-Rev. 00

EFFECTIVE DATE: 31ST AUGUST 2021

Guidance on flight Inspection of Radio Navigational Aids

Director General

Sierra Leone Civil Aviation Authority

1. GENERAL

The Sierra Leone Civil Aviation Authority's Advisory Circulars contains information about standards, practices and procedures that the Authority has found to be an Acceptable Means of Compliance (AMC) with the associated Regulations.

An AMC is not intended to be the only means of compliance with a Regulation, and consideration will be given to other methods of compliance that may be presented to the Authority

Information considered directive in nature is described in this AC in terms such as "shall" and "must", indicating the actions are mandatory. Guidance information is described in terms such as "should" and "may" indicating the actions are desirable or permissive, but not mandatory

1.1 Purpose

The purpose of this AC is to provide guidance necessary for the flight inspection of radio navigational aids, including inspection types and facilities subject to inspections.

1.2 Applicability

This AC is applicable to Air Navigation Service Providers (ANSPs) providing Communication Navigation and Surveillance services in Sierra Leone.

1.3 Description of Changes

This AC is the first to be issued on this subject

1.4 References

(a) SLCAR Part 10A (Radio Navigation Aids)
(b) ICAO Annex 10 Vol 1
(c) ICAO DOC 8071; Manual on Testing of Radio Navigation Aids. Vol I

1.5 Cancelled Documents

Not Applicable

1.6 Abbreviations

The following abbreviations used in this document:

AC - Advisory Circular
ANS - Air Navigation Service
ANSP - Air Navigation Service Provider
AIP – Aeronautical Information Publication
ATC – Air Traffic Control
ATM – Air Traffic Management
CNS – Communication Navigation and Surveillance
CVOR – Conventional VHF Omnidirectional Range
DME – Distance Measuring Equipment
DVOR - Doppler VHF Omnidirectional Range

ICAO - International Civil Aviation Organization
ILS – Instrument Landing System
NAVAIDS – Navigational Aids
SLCAA – Sierra Leone Civil Aviation Authority
VHF – Very High Frequency
UHF - Ultra High Frequency

2 GUIDANCE AND PROCEDURES

2.1 Pre- Flight Inspection Preparations

(a) Ground Technician/Engineers shall make preparations prior to a flight inspection to ensure that the flight inspection is efficiently conducted.
(b) Ground CNS Technician/Engineers shall complete equipment adjustments and other technical preparations for the navigational aid in question
(c) The following are the points to be observed during pre-flight inspection preparation:
  (i) Ensure that the result of all possible ground calibration and checking equipment are correct.
  (ii) Competent maintenance personnel are available to make corrections and adjustments during flight inspection.
  (iii) Availability of dedicated transport for equipment and personnel is ensured during the entire course of flight check.
  (iv) Ensure all special tools and instruments are available at the site.
  (v) Availability of last flight inspection report.
  (vi) Any requirement of special investigation during flight inspection shall be submitted in advance and followed up with SLCAA during flight inspection.
  (vii) In case the facility is not expected to be ready as per the regular scheduled inspection, the SLCAA must be advised accordingly.
  (viii) NOTAM for withdrawal of facility during Flight Inspection shall be issued without fail in coordination with local ATC.

2.2 Coordination during Flight Inspections

(a) When equipment needs to be adjusted while flight inspection is in progress, the ground technical staff shall notify the flight inspector and make the necessary adjustment.
(b) An ANS provider shall notify relevant agencies that the navigational aid in question is undergoing a flight inspection.

2.2 Types of Flight Inspections

Flight inspections are classified and shall be carried out as follows:

(a) **Site approval:** Inspection to be carried out to confirm that the location selected for installation of a new navigational aid is appropriate, it may include checks normally made during a commissioning inspection and any additional tests which may be required.

(b) **Commissioning:** is a comprehensive inspection to be carried out to obtain complete information regarding all aspects of performance of navigational aids. The facility shall not be declared operational before this check.

(i) **Periodic:** Inspection to be conducted on a regular basis to confirm the validity of navigational aids.

(ii) **Surveillance:** surveillance inspection shall be carried out to ensure that Navigational aids facility is being maintained within tolerance limits in spite of the inherent drift in the equipment. Surveillance inspections do not normally involve major adjustments unless the performance is observed to have drifted either close to, or beyond the applicable tolerance limits.

(iii) **Special Inspections:** Special flight inspection shall be made on special request to confirm satisfactory performance. It may follow a major maintenance on the equipment especially the antenna system. Special Flight Inspection may also be carried out for investigation purpose after any incident or accident.

2.3 Flight Inspection Unit

Flight inspection of navigational aid shall be conducted by organizations or units that are approved by the SLCAA.

2.4 Flight Inspection Aircraft

(a) This section describes the concept for the special requirements of the aircraft, flight inspection crew members and ground support equipment used for flight Inspection.

(b) Appropriately equipped aircraft shall be used when required to undertake flight inspection. The general characteristics of a flight inspection aircraft shall be as follows:

(i) Aircraft equipped with special instrument for flight check

(ii) Sufficient capacity for a flight inspection crew, ground maintenance and/or installation personnel, and required electronic equipment.

(iii) Sufficient range and endurance for a normal mission.

(iv) Aerodynamically stable throughout the speed range.

(v) Low noise and vibration level

(vi) Adequate and stable electrical system capable of operating required electronic and recording equipment and other aircraft equipment.

(vii) Wide speed and altitude range to allow the conduct of flight inspections under normal conditions as encountered by the users.

(viii) Appropriate for modifications for flight inspection of new and improved navigation services.

2.5 Flight Inspection Crew Members

The members of the flight inspection crew shall be experts in their individual fields, have sound knowledge and experience in flight inspection procedures and be capable of working as a team.

2.6 Airborne and Ground Support Equipment

The selection and utilization of flight inspection equipment used to determine the validity of navigational information shall minimize the uncertainty of the measurement being performed.

Aircraft and ground support flight inspection equipment shall be calibrated to appropriate standards.

2.7 Preparation of Flight Inspection Plan

(a) ANS provider shall prepare the following year's flight inspection plan for navigational aids that require flight inspections and notify the SLCAA.
(b) ANS provider shall send one copy of the flight inspection records of the previous year to the SLCAA.
(c) When it is necessary to change the flight inspection date, ANS provider shall notify the SLCAA of the changed flight inspection date.
(d) The CNS provider shall forward to the Authority, Estimated Time of Arrival (ETA) of the flight calibration aircraft.
(e) Ensure Coordination shall be established between Flight inspection crew and maintenance personnel at all times before, during, and after flight inspection.
(f) Prepare two-way radio communications equipment (Handheld) and resources at facility locations and ATC Tower.

2.8 Priority of Flight Inspections

ANS provider shall conduct flight inspections according to the following priorities:

(a) Inspection requested from a concerned agency in relation to an aircraft accident
(b) Inspection to correct a malfunction of a navigational aid, inspection of a reported malfunction, or malfunction inspection after repairs according to a plan.
(c) Periodic, Commissioning, inspection of instrument flight procedures, and site approval.

2.9 Inspection after upgrading or modification of facility

Inspection shall be carried out when the conditions below prevail:

(a) Upgrade/modification of feeders, antennas, and other major components;
(b) Change in location of antenna or upgrade/modification of VOR counter poise;
(c) Modification or replacement of main components of the transmitter;
(d) Change in operation frequency and/or ID code;
(e) Change in transmission output following increase or decrease of a navigational aid's service area;
(f) Where there is concern for signal interruption from construction of a building, a power line, or other obstacles in the vicinity of an operating navigational aid;
(g) Partial upgrade/modification or extension of any operating light system (approach light, approach angle indicator light, runway indicator light); and
(h) Other special flight inspections deemed necessary.

2.10 Basic Schedule for Periodic Flight Inspection and Ground Check

This section prescribes the minimum frequency of periodic flight inspections and ground check. More frequent inspections may be made when deemed necessary. Facilities subject to flight inspections and ground check and the frequency of their inspections and checks are as follows:

S/N	NAME OF FACILITY	GROUND INSPECTION PERIOD	FLIGHT INSPECTION PERIOD	MAINTENANCE STANDARDS
1	ILS	3 months	6 months	8071 vol. 1 Annex 10 vol. 1
2	CVOR	12 months	12 months	8071 vol. 1 Annex 10 vol. 1
3	DVOR	12 months	5 years	8071 vol. 1 Annex 10 vol. 1
4	DME Co-Located with ILS	3 Months	6 months	8071 vol. 1 Annex 10 vol. 1
	DME Co-located with DVOR	12 Months	5 years	8071 vol. 1 Annex 10 vol. 1
	DME Co-located with CVOR	12 Months	12 Months	8071 vol. 1 Annex 10 vol. 1

2.10.1 ATC Facility (VHF, UHF) and aeronautical information broadcasting facilities shall be inspected when the radar facilities are commissioned.

2.11 Flight Inspection Notification Status

(a) ANS provider shall determine operation levels of navigational aids as follows based on the results of flight inspections and notify relevant agencies for publication in AIP.

(b) Usable is a status assigned to navigational aids that are deemed to be operational in a flight inspection and shall be assigned one of the following operational status:

(i) *UNRESTRICTED*: Assigned in cases where signals-in-space can be generated within the navigational aid's coverage area to maintain safety and continuity of the navigational aid and precise signals can be sent.

(ii) *LIMITED OR RESTRICTED*: Assigned in cases where there are spaces that cannot send normal signals in all or some sections within the coverage area of the navigational aid. In such cases, limited/restricted use of navigational aid can be assigned in sections where there are no impediments in use of the air navigational aid in question by an aircraft. However, limited/restricted status shall not be assigned when judged that it is difficulty to secure safety and continuity of the navigational aid.

(iii) *UNUSABLE*: Assigned in cases where it is judged that the navigational aid cannot be used due to difficulty in securing safety and continuity of the navigational aid within its operational range or in cases where there are airspaces wherein flight inspections cannot be conducted because of signal failure, designation as a no fly zone, or airspace use is restricted for other reasons.

2.12 Notification of Status Levels of Navigation Facilities

When it is deemed necessary to newly assign or change the status level of navigational aids following results of a flight inspection, ground CNS engineer /technician shall notify the relevant agencies for status to be published in the AIP. When it is deemed that an immediate action is needed, the following shall be observed.

(a) For a navigational aid assigned unrestricted, restricted or usable, a request shall be made to the relevant agency so that notification of the assignment or change in operational status can be made immediately in the NOTAM.
(b) For a navigational aid assigned unusable status, action shall be taken to immediately suspend operation of the navigational aid.

2.13 In-Flight Inspection

During the inspection, flight inspector shall advise CNS Engineer of observed conditions which require adjustment of ground equipment. Request for adjustment shall be specific and readily understandable. Normally the flight inspector is not expected to diagnose the fault, but shall furnish sufficient information to enable the maintenance team to make the corrective adjustment when the aircraft is airborne and record the adjustments done for post analysis. Relevant measurements on ground for establishing a meaningful correlation with the flight check results after each run shall be taken.

2.14 Post-Flight Inspection Measures

2.14.1 Flight inspector

(a) The flight inspector shall determine the operational status of the navigational aids in question after completing the flight inspection and notify the ground technical staff whether or not the navigational aid passed or failed the flight inspection.

2.14.2 ANS Provider

(a) ANS provider shall prepare a report of flight inspection results within 14 days after completion of the flight inspection and convey same to SLCAA. An immediate report shall be made to the SLCAA of any navigational aid that fails flight inspection.
(b) ANS provider shall keep commissioning data records of the navigational aid in question until its permanent disuse and shall keep records of scheduled inspections and other flight inspections for at least 5 years.

2.14.3 Ground CNS engineer shall:

(a) Take action as per the advice of Flight Inspector;
(b) Take relevant measurements on ground for establishing a meaningful correlation with the flight check results;
(c) Implement the suggestions in the final report; and
(d) Advice the SLCAA and all concerned regarding any major change in the facility performance through NOTAM.